

Ambulance Association of Arizona  
Flagstaff, Arizona, July 11th, 2008



**Ambulance Transport Safety!**



Nadine Levick, MD/MPH  
Research Director, EMS Safety Foundation  
CEO, Objective Safety  
New York, NY

► To quote Steve "Sid" Caesar –  
Director IHS ES

*"We want everyone to get home safely each day"*

**A tragic emergency health care intervention outcome**



**Rollover Crash Kills Medical Technician**  
Jonathan Romano, 37, died after the Spring Hill Ambulance No. 1000 rolled over on Wednesday.

**It does happen....**

**A devastating tragedy...**

► An ETT down the wrong hole may kill your patient and be a terrible burden for the pts family and for the medic involved

► BUT an EMS crash can kill all involved AND wipe out an EMS systems response capacity.....

**... Nov 8<sup>th</sup>'s Fatality**

**Putnam Co. paramedic dies in ambulance crash**  
By Jonathan Romano  
VALHALLA, N.Y. — A Putnam County paramedic returning from an ambulance call has died after the vehicle went off the road and struck a tree.

Authorities say Matthew Lamb of Carmel was riding in an [Emergency Ambulance Corp.](#) vehicle at 5 a.m. Wednesday when it veered off the road and struck a tree in Genesee.

Lamb suffered massive head trauma, state police said.

State police coroner investigator Bruce Garcia told the Journal News it appears the [crash led to a fatality](#).

Carmel Fire Chief Daryl Johnson says Lamb was taken off life support and pronounced [dead](#) on Thursday at the Westchester County Medical Center.

[The story](#) Jonathan Romano of the [Hudson Valley News Service](#)

<http://www.objectivesafety.net>



**Real world answers to real world questions -**

- What features will enhance safety of my new vehicle purchase?
- What color scheme do I want on my vehicle to make it safest?
- Do I need a helmet, and if so which one?
- What policies offer the safest system?
- How do I get my team to address safety issues?
- What data should I collect when something goes wrong, and how to analyze it?

**Outline**

- I. Review of data on ambulance crashes and safety standards and guidelines that exist for the ground EMS
- II. Identification of ground EMS transport safety issues, hazards and areas of risk to patients, providers and public
- III. Highlight unacceptable mythology and challenges to advancing EMS transport safety
- IV. Profile innovation, new safety technologies and strategies and knowledge transfer to enhance safety and reduce risks of ground EMS and patient transport

**EMS Transport Safety**

- 'patient safety'
- AND also
- 'provider' and 'public safety'



**Firstly!**

▶ **An accident ?**

▶ **or**

▶ **a predictable and preventable event**

**In a nutshell**

▶ **Am here to try to save you**

**Lives**

**Time and**

**Money**

**Thursday July 5<sup>th</sup> 2007.....**

**Paramedic Allan Parson's killed**

**NEWS CENTER**

**Paramedic Killed in Turner Ambulance Crash**

By Staff Writer, 8/20/07  
Published: 8/20/07 12:00 PM  
Updated: 8/20/07 12:00 PM

**MURKIN (NEWS CENTER)** - The Man Cave paramedic was killed when the ambulance involved in a serious crash Tuesday night in Turner at about 10:30 p.m.

The Murkyn (NEWS CENTER) Department was the first ambulance to arrive at the scene of the crash. The ambulance was involved in a crash with a semi-trailer at the intersection of Turner and State Routes 100 and 101. The ambulance driver, 38-year-old Allan Parson, was killed. The driver of the semi-trailer, 40-year-old Robert Smith, was also killed. The ambulance was involved in a crash with a semi-trailer at the intersection of Turner and State Routes 100 and 101. The ambulance driver, 38-year-old Allan Parson, was killed. The driver of the semi-trailer, 40-year-old Robert Smith, was also killed.

**"...I'd like to know what can be done so this never happens again...."**

**Posted By (removed) at July 5, 2007 4:38 PM (Suggest Removal)**  
to all the people worried about how fast the emt was going, would it be fast enough if it was your loved one in there.....

**Posted By (removed) at July 5, 2007 4:19 PM (Suggest Removal)**  
to mad, it would be too fast if they ran over my family member on their way to another's family member...

**Posted By (removed) at July 5, 2007 4:58 PM (Suggest Removal)**  
to it responder, why don't you just gun that a mor in cloud and I want to know if the nation and nation surrounding this work worth this not loss. And I'd like to know what can be done so that this never happens again.

**2 weeks later... Friday July 20<sup>th</sup> 2007**

**The worst ambulance crash in USA history**

**Five Killed in Crash of Ambulance and Semi**

July 21, 2007 08:20 AM EDT

The Highway Patrol says three EMS workers were killed. They were identified as 41-year-old Sammy Smith, 31-year-old Heidi McCougl and 31-year-old Kelly Egan. The two patients were also killed. They were identified as 64-year-old Robert Smith, 60-year-old Amanda Smith and 60-year-old...

The ambulance, with four Antwerp Emergency Medical Services workers aboard, was taking two victims from an earlier car crash to a hospital. Troopers say it was broadsided by a tractor-trailer at the intersection of county Road 136 and County Road 87. The ambulance then burst into flames.

**Antwerp fire chief says, "They were doing what they loved..."**

**Local News**  
July 21, 2007

**EMERGENCY PERSONNEL THROUGHOUT THE REGION ARE ALSO SHOCKED AND MOURNING THEIR OWN.**

"That's one of our worst scenarios when it's one of our own," said Con Shuhert of the Payne Fire Department.

"Everyone is a brotherhood," said Friend. "Everybody looks after everybody."

Randy Shaffer, director of Paulding County Emergency Management Agency, said the accident has had a deep impact.

"It has affected every emergency personnel in the county," he said. "We know it could happen at any time. We read about it in our newsletter. We just don't think it's going to happen to us."

Shaffer said when a call came in that an ambulance was involved in an accident Friday, "I think every squad in the county activated."

**Fatalities and funerals**

**Funeral Services Held For Marble Falls Paramedic**

Funeral services for paramedic Allan Parson were held in Marble Falls, Texas, on Tuesday. The services were held at the Marble Falls Community Center. Parson was killed in a crash on July 5, 2007, while responding to a call in Turner, Georgia. He was 38 years old. The ambulance he was driving was involved in a crash with a semi-trailer at the intersection of Turner and State Routes 100 and 101. The ambulance driver, 38-year-old Allan Parson, was killed. The driver of the semi-trailer, 40-year-old Robert Smith, was also killed.

**Charged with Vehicular Homicide**

**Penn Top, ambulance driver faces charges in crash - Pennsylvania**

A Penn Township Rescue 9 ambulance driver faces a charge of homicide by vehicle in an Oct. 30 accident in Hemphelf that killed a Westmoreland County Prison guard.

A Penn Township Rescue 9 ambulance driver faces a charge of homicide by vehicle in an Oct. 30 accident in Hemphelf that killed a Westmoreland County Prison guard.

Jason Falt, 30, of 5650 Barnes Lake Road, North Huntingdon, was arraigned this week and will have a preliminary hearing at 1:45 p.m. Sept. 27 before Jeannette District Judge Joseph Seltzer. Bond was set at \$25,000 unsecured. Falt also was charged with reckless driving, careless driving and other traffic offenses.

State police at Greensburg said Falt was driving an ambulance west on Route 130 at 6:49 a.m. Oct. 30 when he ran a red light at North Greengate Road and hit a Ford Bronco driven by Frank Scalise Jr., 46, of Marysville, that was traveling south.

Scalise, who began working at the prison in 1992, was reportedly on his way there at the time. According to the criminal complaint, Scalise was taken by medical helicopter to UPMC Pittsburgh. He died Nov. 3 of blunt-force trauma to the head, according to the Allegheny County Medical Examiner's Office.

Falt was not injured, but the ambulance was heavily damaged. Police indicated the ambulance was returning to its station after transporting a patient and did not have lights or siren activated. Asked about Falt's employment status Friday, a representative of the ambulance association had no comment.

**2 killed, 3 injured....  
September 23, 2007 - PA**

**Car, Ambulance Collide in Marshall Township: 2 Dead**  
PHOTO: 100.com for Pennsylvania, 2007  
 07/24/07 05:02 am EDT November 23, 2007

**MARSHALL TOWNSHIP, Pa.** -- An ambulance and car collided along Route 19 at Troubrook Road in Marshall Township Sunday, killing two people and injuring three others.

Police said Douglas Ott, 36, of Mercer, and Philip Reiss, 31, of Sharysville, were driving a car at about 2:30 a.m. when their vehicle and the ambulance collided.

The medical examiner said both Ott and Reiss died of head injuries.

Three people riding in a Cranberry Township ambulance were also injured. Their conditions and names have not been released.

The three injured victims remain in the hospital.

**2 counts of vehicular homicide...  
November 5, 2007 - PA**

**Drunken ambulance driver killed 2 in car crash - Pennsylvania**

A 22-year-old ambulance driver drank before her shift and was impaired when she collided with a car in Marshall, killing two men instantly, Allegheny County District Attorney Stephen A. Zappala Jr. said today.

Shanea Leigh Climo, 22, of Evans City, is charged with two counts of homicide by vehicle and involuntary manslaughter, driving under the influence and several traffic offenses in the Sept. 23 collision at Perry Highway and Brush Creek Road. She was arrested this morning, arraigned and released on her own recognizance, authorities said.

Police said an on-board camera system in the ambulance helped them decide to file charges. The camera allegedly shows the face of the driver, Shanea Climo.

Zappala said Climo was traveling south on Route 19, transporting a patient with a do-not-resuscitate order to UPMC Passavant, when she ran a red light and hit a Chevrolet Cavalier driven by Douglas Stitt Spitt and a passenger, Philip Bacon, were killed.

The patient later died, but his death was not believed to be related to the crash, Zappala said.

**An interhospital transport  
? "Do no harm...."?**

DATE ADDED: Tuesday, January 31, 07:16:07  
 #1024287 | [Add This Article](#) | [What This Article Is About](#) |

**Pa. ambulance involved in crash; patient pronounced dead at scene**

By Elizabeth Trane  
 The York Dispatch (York, Pa.)  
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An Allegheny County ambulance carrying a patient to York Hospital collided with a car at the intersection of Routes 20 and 61 in West Manchester Township at 7:47 p.m. Sunday, and the public it was pronounced dead at the scene.

York County's Coroner Clay DeShazo told the patient, a woman, who being transported from Gettysburg Hospital, Ansonia, Pa. was suffering a "ruptured" heart condition.

He said he will try to determine whether the road in this particular area and road prior to the crash, or whether the car had a fatal fault, a lack because of it, after the crash. He also said he will try to determine if the ambulance driver was at fault.

**Benefit of Safety**

- ▶ Any cost of addressing these issues is dwarfed in contrast to the huge burden of not doing so - in financial costs let alone the personal, societal, ethical and litigation costs

**Unique workplace**

- ▶ In vehicles
- ▶ At roadside and other emergency scenes

**Absence of standards and oversight**

- ▶ Challenges in identifying best practice
- ▶ Myriad of unregulated commercial products
- ▶ No safety performance standards
- ▶ Absent national safety oversight

**Challenges to Optimizing  
EMS Transport Safety**

- ▶ Disparate and fragmented safety infrastructure
- ▶ Lack of a centralized EMS Safety oversight or data
- ▶ A large number of small groups of end users, with a mix of volunteers and professionals
- ▶ Ambulances are hybrid non-standard vehicles, a truck chassis and an after market box or a modified van
- ▶ EMS vehicle safety is not integrated as a part of the transport safety industry

**1960 to 2007**



**Some recent adverse outcomes**



**UPS and Laundry trucks have very similar design and even more stringent safety requirements to EMS vehicles BUT very different cargo.....**

**People are passengers and NOT packages or parcels**

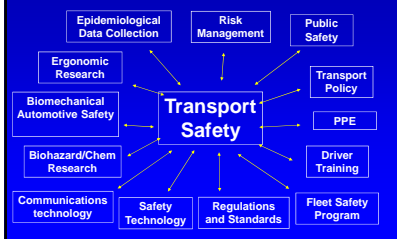
### Some odd facts

- ▶ Ambulances are generally not built by the automotive industry
- ▶ Intelligent Transportation Systems (ITS), transportation safety engineering is not generally integrated into EMS systems
- ▶ Although all EMS systems have medical direction and oversight, it is rare for there to be transportation expertise oversight

### EMS Transport General Concerns

- ▶ Consequences can be predictable & likely preventable
- ▶ Costs of these adverse events are high in loss of life, financial burden and negative impact on delivery of EMS care
- ▶ Other high speed vehicles (eg. racing cars) have a different safety paradigm
- ▶ Design of interventions to mitigate injury is predicated on a valid testing model
- ▶ Complex both engineering and public health issues

### Ground Transport Safety IS Complex AND Multidisciplinary



### What do we know now??

- ▶ Intersection crashes are the most lethal
- ▶ There are documented hazards, some which can be avoided
- ▶ Occupant and equipment restraint with standard belts is effective. (Over the shoulder harnesses for patients should be used, with the gurney in the upright position where medically feasible)
- ▶ Some vehicle design features are beneficial - automotive grade padding in head strike areas, seats that can slide toward the patient
- ▶ Electronic Driver monitoring/feedback systems appear to be highly effective
- ▶ Head protection??

### Transport oversight?

- ▶ In contrast to the bus and truck industries, which have -
  - comprehensive safety oversight
  - transportation safety interventions
  - transportation safety data capture via the Federal Motor Carrier Safety Administration (FMCSA)
- ▶ EMS has been focused more as an acute health care delivery and emergency medical service and largely outside of much of the other transportation oversight infrastructure that exists

### Safety oversight of what and .... by whom

- ▶ Vehicle Safety
- ▶ Vehicle Design
- ▶ Transportation systems safety
- ▶ Safety Equipment Design
- ▶ Vehicle and Safety Equipment Testing and Standard development
- ▶ Safety policies

### There are more safety standards for moving cattle than for moving patients



## A Simple Question....

November 25, Issue 54 April 2005

# WINGS, WHEELS & ROTORS

Air & Surface Transport Worker Association

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### A Simple Question

Andrew Lovell, MS, MPH

**W**hat have all been more more...  
 I have to have just more the  
 very positive side of the way  
 in which our sectors works to protect  
 its members. The more 97500 injury  
 rate the simple question is  
 "Are you going back for a second, or  
 ask a simple question. "Have those fat  
 tires had over those parts of our more  
 value than the approximately 14 from  
 cover a single year is around 1300

...and we care for the lives of the sick and  
 injured. We value your courage to  
 represent the safety of the clearly dan-  
 gerous work we do.  
 I challenge all of you to think about  
 this, and what we will do here today, to  
 represent the safety of your general  
 EMT practice and its relevance to the  
 lives and right which to have on the  
 address. Each general and all EMT  
 units, in all of the National Emer-  
 gency Safety Board. The view is to

## Canada - Corporate Manslaughter Corporate Homicide Act: 8th April, 2008



Corporate Manslaughter and  
Corporate Homicide Act 2007

**Section 1**  
 (1) A person is guilty of an offence if, as a result of his or her neglect, a person dies as a result of an accident at work.  
 (2) A person is guilty of an offence if, as a result of his or her neglect, a person dies as a result of an accident at work.  
 (3) A person is guilty of an offence if, as a result of his or her neglect, a person dies as a result of an accident at work.  
 (4) A person is guilty of an offence if, as a result of his or her neglect, a person dies as a result of an accident at work.  
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 (9) A person is guilty of an offence if, as a result of his or her neglect, a person dies as a result of an accident at work.  
 (10) A person is guilty of an offence if, as a result of his or her neglect, a person dies as a result of an accident at work.


## the EMS transport process

- ▶ communications/dispatch
- ▶ the patient
- ▶ restraining device/seat
- ▶ transporting device/gurney
- ▶ paramedics/transport nurses, doctors & family
- ▶ patient monitoring equipment
- ▶ clinical care & interventions
- ▶ protective equipment
- ▶ the vehicle
- ▶ the driver/driving skill
- ▶ other road users
- ▶ the road

TIME

PLACE

## The Emergency Department (ED)



## An ambulance is not an ED /ICU on wheels




## National EMS data

In the USA\*

- ▶ ~ 50,000 vehicles
- ▶ ~ 5,000 crashes a year
- ▶ One fatality each week
  - + ~ 2/3 pedestrians or occupants of other car
  - + Approximately 4 child fatalities per year
- ▶ ~10 serious injuries each day
- ▶ Cost estimates > \$500 million annually
- ▶ USA crash fatality rate/capita 35x higher than in Australia

\*FAA/STB 2005-6

## Is it your service's tragic year?

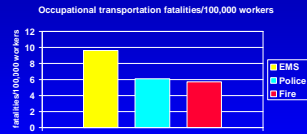
- ▶ ~ 50 fatalities a year
- ▶ 15,000 EMS services
- ▶ Each year one in 300 services experiences a fatality

## Predictable risks

- ▶ Fatal crashes more often at intersections, & with another vehicle (p < 0.001)
- ▶ 70% of fatal crashes EMS crashes during Emergency Use\*
- ▶ Most serious & fatal injuries occurred in rear (OR 2.7 vs front) & to improperly restrained occupants (OR 2.5 vs restrained)\*\*
- ▶ 82% of fatally injured EMS rear occupants unrestrained\*\*
- ▶ > 74% of EMT occupational fatalities are MVC related\*\*\*
- ▶ Serious head injury in >65% of fatal occupant injuries#
- ▶ More likely to crash at an intersection with traffic lights (37% vs 18% p=0.001) & more people & injuries/crash than similar sized vehicles##

\*Kohn CA, Pirralo RG, Kohn EM. Prehosp Emerg Care 2001 Jul-Sep;5(3):281-9  
 #Baker, Sacramento, Lovell, Li, Miller. Accid Anal Prev 2003  
 ##Maguire, Hastings, Smith, Lovell, Auld. Emerg Med 2002  
 #AWQSR 2003  
 ##Wright AM, Kohn EM. Prehosp Emerg Care 2005 Dec; 9:412-418

## Occupational transportation fatalities..



▶ WE HAVE A BIG PROBLEM HERE

\* Maquire, Hunting, Smith & Levick, Occupational Fatalities in Emergency Medical Services: A Hidden Crisis, Annals of Emergency Medicine, Dec. 2002

## 'Workplace' Hazards



## and what is killing EMS ?

### EMS personnel fatalities\*

- ▶ 74% transportation related
  - 1/5 of ground transport fatalities were struck by moving vehicles
- ▶ 11% were cardiovascular
- ▶ 9% were homicide
- ▶ 4% needle sticks, electrocution, drowning and other

\* Maquire, Hunting, Smith & Levick, Occupational Fatalities in Emergency Medical Services: A Hidden Crisis, Annals of Emergency Medicine, Dec. 2002

- ▶ "Ambulance transport has a death toll...."

Carl Craigle EMT-P, Chief Platte Valley Ambulance  
Colorado Springs, April 2007

## Clinical Care? Occupational Health and Safety.....?

- ▶ This IS a Transportation and Automotive Safety issue
- ▶ This is a Systems safety issue

## What do ambulance crashes really cost ?

- ▶ Loss of life and injury
- ▶ Negative impact on EMS system
- ▶ Collisions are the largest liability cost and exceeds malpractice or negligence
- ▶ Besides the direct financial costs of replacing a damaged ambulance and equipment, there are additional hidden costs incurred:
  - investigating the ambulance collision
  - litigation /settlement/lawsuit
  - medical/disability costs of injured EMTs
  - hiring of new employees to replace injured personnel
  - retaining and psychological counseling of personnel involved and others
  - increased insurance rates

## Safety is Good Business



## A problem

2007 Insurance data –

- ▶ 27 fold more likely to have a claim based on transport than related to medical care

Accident Cost Table

REVENUE NECESSARY TO PAY FOR ACCIDENT LOSSES  
THIS TABLE SHOWS THE DOLLARS OF REVENUE REQUIRED TO PAY FOR DIFFERENT AMOUNTS OF COSTS FOR ACCIDENTS

It is necessary for a motor carrier to generate an additional \$1,250,000 revenue to pay the cost of a \$25,000 accident, assuming an average profit of 2%. The amount of revenue required to pay for losses will vary with the profit margin.

YEARLY ACCIDENT COSTS	PROFIT MARGIN				
	1%	2%	3%	4%	5%
\$1,000	100,000	50,000	33,000	25,000	20,000
5,000	500,000	250,000	167,000	125,000	100,000
10,000	1,000,000	500,000	333,000	250,000	200,000
25,000	2,500,000	1,250,000	833,000	625,000	500,000
50,000	5,000,000	2,500,000	1,667,000	1,250,000	1,000,000
100,000	10,000,000	5,000,000	3,333,000	2,500,000	2,000,000
150,000	15,000,000	7,500,000	5,000,000	3,750,000	3,000,000
200,000	20,000,000	10,000,000	6,666,000	5,000,000	4,000,000

REVENUE REQUIRED TO COVER LOSSES

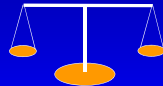
## Benefit of Safety

- ▶ Safe practices save lives, time and money

## This is about you and your safety

- ▶ What safety practices do you use??
  - Seat belts ?
  - EVOC training ?
  - Equipment lock down ?
  - Helmets ?
  - Driver Feedback technology ?
  - Tiered dispatch ?

## Balance of concerns and risk during transport

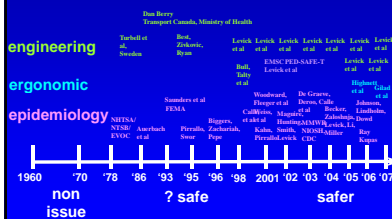


- ▶ Response and transport time
- ▶ Clinical care provision
- ▶ Occupant safety/protection
- ▶ Public Safety

## Goals

- ▶ Standards for safety
- ▶ Policy based on Science
- ▶ Databases to demonstrate outcome

## Ambulance Safety Research: A New Field



## A peer reviewed tragedy

- ▶ Persistent disconnect between automotive safety science and EMS transport safety approach
- ▶ Pre-hospital and Emergency Care 2004
  - "EMS vehicle drivers are advised to approach the intersection, slowing to ensure that traffic has stopped and making eye contact with other drivers before entering the intersection."
- ▶ In the modern era of road safety to suggest that a strategy of "eye contact" to be made at an intersection with a driver traveling at ~ 40mph in the hope that this would result in a safety intervention, is at best frightening

## What do we know now??

- ▶ Intersection crashes are the most lethal
- ▶ There are documented hazards, some which can be avoided
- ▶ Occupant and equipment restraint with standard belts is effective. (Over the shoulder harnesses for patients should be used, with the gurney in the upright position where medically feasible)
- ▶ Some vehicle design features are beneficial - automotive grade padding in head strike areas, seats that can slide toward the patient
- ▶ Electronic Driver monitoring/feedback systems appear to be highly effective
- ▶ Head protection??

### Increasing awareness ...

The image shows several overlapping screenshots of websites related to EMS safety. One prominent one is 'EMS CLOSE CALLS' with a 'THINK ZONE' logo. Another is 'Firefighter Close Calls.com'. There are also smaller logos and text fragments from other sites.

### Risk/Hazards

- ▶ Predictable risks
- ▶ Predictable fatal injuries
- ▶ Serious occupational hazard
- ▶ Public safety hazards

### EMS Best Practice, Sept 2006

The image is a newspaper clipping with several articles. The main headline is 'EMS Best Practice, Sept 2006'. Sub-headers include 'What can emergency workers learn by their own organization to prevent ambulance safety?' and 'Personnel Not Buckling up'. The text discusses safety protocols and the importance of seat belt use.

### IMPORTANT ADVISORY

- ▶ Due to respect for the wishes of the families of medics killed in the line of duty there is to be **NO PHOTOGRAPHY** of any aspect of the images in this presentation - that is **NO video, NO photography, NO digital images** of any type

The image shows a newspaper clipping with a photograph of a severely damaged ambulance that has rolled over. The headline reads 'Rollover Crash Kills Medical Technician'. Below the photo, there is text describing the incident and the impact on the medical profession.

### But what about head protection?

The image shows a close-up of a modern EMS helmet, likely an Alpha helmet, featuring a clear face shield and various safety features. The helmet is shown from a front-facing perspective.

### New EMS helmet prototypes for 2008

The image displays a grid of eight different EMS helmet prototypes. They vary in color (yellow, white, green, black) and design, showing various ventilation systems and visor attachments.

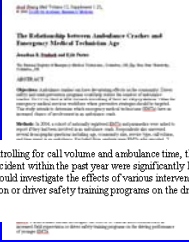
### What are the solutions?

- ▶ Training?
- ▶ Practice Policy?
- ▶ Transportation Systems Engineering?
- ▶ Automotive Engineering?
- ▶ Education of other road users???

### The Driver

- ▶ Driver selection
- ▶ Driver monitoring and feedback
- ▶ Driver Impairment
- ▶ Driver training

## Driver issues



**Conclusions:** When controlling for call volume and ambulance time, the odds of having been in an ambulance accident within the past year were significantly higher for younger EMTs. Future studies should investigate the effects of various interventions such as increased field supervision or driver safety training programs on the driving performance of younger EMTs.

## Which is best, how many hours...??



## What about changing driver behavior in the real world??

### AN OPTIMAL SOLUTION FOR ENHANCING AMBULANCE SAFETY: IMPLEMENTING A DRIVER PERFORMANCE FEEDBACK AND MONITORING DEVICE IN GROUND EMERGENCY MEDICAL SERVICE VEHICLES

Nadine R. Levick, MD, MPH  
Maimonides Medical Center

### REAL WORLD APPLICATION OF AN AFTERMARKET DRIVER HUMAN FACTORS REAL TIME AUDITORY MONITORING AND FEEDBACK DEVICE: AN EMERGENCY SERVICE PERSPECTIVE

Nadine Levick  
Objective Safety LLC  
United States of America  
Larry W. Kersch  
Michael J. Nagel  
Cognitive Architecture  
United States of America  
Paper Number 07-2224

## Purpose of 'Feedback box' Program

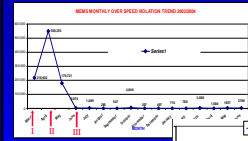
- ▶ Enhance Safety
- ▶ Improve Driver Performance
- ▶ Save Maintenance Dollars
- ▶ Aid Accident / Incident Investigation

## How the Device Works

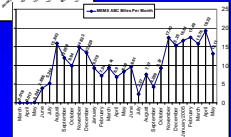
- ▶ Computerized monitoring device installed on each vehicle to measure parameters
- ▶ Each driver has individual key "fob"
- ▶ Data collected every second
  - including: vehicle speed and performance, driver behaviors and emergency mode
- ▶ Auditory feedback of warning 'growls', and penalty tones
- ▶ Data downloaded automatically every day



## Demonstrated Effectiveness



- I - blind data, no growls
- II - growls & tones ON unidentified data capture
- III - identified data



## A key to safe ambulance transport



## Monitoring and feedback devices

- ▶ Implementation well received by the providers.
- ▶ 20% cost saving in vehicle maintenance within 6 months.
- ▶ No increase in response times
- ▶ Fewer crashes and less severe crashes
- ▶ Sustained improvement in safety proxies, with no inservice or retraining after the initial introduction period.

## Other monitoring devices

- ▶ Primarily to record events during and immediately preceding a crash
- ▶ Give no driver crash prevention feedback
- ▶ Administratively burdensome
- ▶ Intrusive
- ▶ Not demonstrated to be as effective in improving vehicle maintenance costs or as effective in modifying driver behavior long term

## You want a system that works!!

- ▶ Does the system really work
- ▶ Is it going to be a major burden on your staff to implement
- ▶ What are the real costs
- ▶ Are you going to have video of your company vehicle on you tube??

## The jury is out on

- ▶ Opticon
- ▶ Simulators

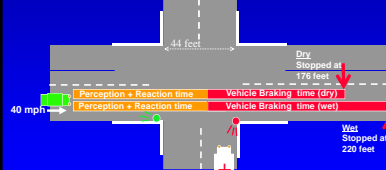
## And very Predictable...

- ▶ Intersections are lethal environments

## So.. The real world for an EMS vehicle approaching a red light

- ▶ You think they heard you...
- ▶ You know they must have seen you..
- ▶ And maybe they did
- ▶ ..... But..
- ▶ There is NO way humanly possible that they could stop.....

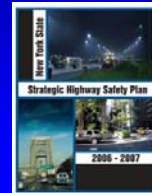
## The real world Intersection passenger car stopping distance\* at 40 mph dry and wet



\* Stopping distance:  
Perception time + Reaction time + Vehicle braking time  
(varies with age, skill, agility, alertness + vehicle type, tire pressure, road etc)

## Integration and Collaboration

EMS Transport Safety Strategies - 2006-2007 New York State Strategic Highway Safety Plan



## State Strategic Highway Safety Plans

- ▶ Required as part of the SAFETEA-LU legislation
  - ♦ (Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users)
- ▶ Effective October 1<sup>st</sup> 2007
- ▶ Focus is the 4 'E's'
  - ♦ Engineering
  - ♦ Education
  - ♦ Enforcement
  - ♦ Emergency Medical Services
- ▶ EMS is a core theme

## State SHSP EMS Focus\*

STATE SHSP	AREA of EMS FOCUS
New York EMS Section 6 of 43 pages	<ol style="list-style-type: none"> <li>1. Emergency Medical Services Dispatch Services</li> <li>2. Emergency Medical Services Partnerships</li> <li>3. Pre-hospital Training Programs</li> <li>4. Road Condition and Incident Response</li> <li>5. EMS Responder Crash Prevention</li> </ol>
Maine EMS Section 4 of 36 pages	<ol style="list-style-type: none"> <li>1. Establish EMS Legislation and Regulation</li> <li>2. Provide EMS Funding</li> <li>3. Enhance Capabilities for Medical Response to Disaster</li> <li>4. Expand EMS Human Resources</li> <li>5. Enhance EMS Education System</li> <li>6. Expand EMS Services</li> <li>7. Facilitate EMS Communications</li> <li>8. Conduct EMS Public Education and Information Programs</li> <li>9. Conduct Injury Prevention Public Awareness Efforts</li> <li>10. Enhance Medical Direction</li> <li>11. Provide Enhanced Trauma System and Facilities</li> <li>12. Establish an EMS Information System</li> <li>13. Evaluate and Monitor EMS Programs</li> </ol>
Alabama EMS Section 6 of 47 pages	<ol style="list-style-type: none"> <li>1. Identify and Analyze Performance Data</li> <li>2. First Responders</li> <li>3. Identify Crash Location</li> <li>4. Statewide assessment and Plan</li> <li>5. Improve EMS Rural Access</li> </ol>

\*Coast H, Leveck N, Strategic Highway Safety Plans, White in EMS J, Jan 2008

## EMS Transport Safety Strategies - 2006-2007 New York State Strategic Highway Safety Plan

- ▶ EMERGENCY MEDICAL SERVICES DISPATCH SERVICES
- ▶ EMERGENCY MEDICAL SERVICES PARTNERSHIPS
  - ♦ Increase the participation and role of Regional EMS Councils in local and regional highway traffic safety boards and/or organizations
- ▶ PRE-HOSPITAL TRAINING PROGRAMS
  - ♦ Train EMS providers in the use of the new medical protocols; provide funds and/or other support to certified EMS Course Sponsors to train EMS providers in the use of these protocols; and collaborate with Regional EMS Councils and/or Regional Emergency Medical Advisory Committees (REMACE) on the development and implementation of training programs
- ▶ ROAD CONDITION AND INCIDENT RESPONSE
  - ♦ Provide a placeholder for regional and/or county EMS representatives in municipal DOT emergency management plan development and implementation

## EMS Transport Safety Strategies - 2006-2007 New York State Strategic Highway Safety Plan

- ▶ **EMS RESPONDER CRASH PREVENTION**
  - Undertake a systematic review of other state actions and protocols on ambulance traffic safety measures to identify and prioritize those appropriate for the New York State pre-hospital system
  - Increase education and involvement of EMS providers in principles of appropriate traffic safety techniques
  - Develop and implement ambulance traffic safety protocols at state, regional and service level
  - Review treatment modalities and protocols to identify those that may contribute to injuries resulting from the impact of ambulance crashes
  - Identify methods to provide incentives for adoption by EMS services of protocols that enhance traffic safety
  - Partner with organizations that provide public driver awareness and education campaigns to improve driver awareness of driver responsibility and appropriate response to approaching emergency vehicles

## Pennsylvania Code

Commonwealth of Pennsylvania  
DEPARTMENT OF TRANSPORTATION  
PART VI. EMERGENCY MEDICAL SERVICES

Chapter  
110. EMERGENCY VEHICLE OPERATIONS

§ 110.1. PURPOSE AND SCOPE.  
§ 110.2. DEFINITIONS.  
§ 110.3. REQUIREMENTS FOR VEHICLES.  
§ 110.4. REQUIREMENTS FOR OPERATORS.  
§ 110.5. REQUIREMENTS FOR TRAINING.  
§ 110.6. REQUIREMENTS FOR EQUIPMENT.  
§ 110.7. REQUIREMENTS FOR CERTIFICATION.  
§ 110.8. REQUIREMENTS FOR INSURANCE.  
§ 110.9. REQUIREMENTS FOR RECORDS.

§ 110.1. *Discipline, report and liability reporting. An ambulance user shall report to the appropriate regional EMS council, in a form or manner prescribed by the Department, an ambulance vehicle accident that is reportable under 75 Pa.C.S., and an accident or injury to an individual that occurs in the line of duty of the ambulance service that results in a fatality, or medical treatment at a facility. The report shall be made within 24 hours after the accident or injury. The report of a fatality shall be made within 8 hours after the fatality.*

## Policy makes a difference...

Organizational policy and other factors associated with emergency medical technicians' seat belt use

Jonathan R. Studnik, Amy Forbach

Journal of Emergency Medical Services, 2006, 31(11):12-14  
Journal of Emergency Medical Services, 2006, 31(11):12-14  
Received 7 August 2006; revised 27 September 2006

**Abstract**  
Introduction: The purpose of this study was to determine how emergency medical technicians (EMTs) and paramedics (paramedics) reported their seat belt use in the field and how their use varied by organizational policy. Methods: A survey was sent to EMTs and paramedics at five different EMS organizations. Results: The majority of respondents reported that they always wore their seat belts. Organizational policy was found to be a significant factor in seat belt use. Conclusion: Organizational policy is an important factor in seat belt use. EMS organizations should consider implementing policies to encourage seat belt use.

## Vehicle Operations Position Statement

Emergency Vehicle Operations  
Position Statement

1. Emergency Vehicle Operations Policy  
2. Vehicle operations training and evaluation  
3. A program of graduated driver responsibility  
4. Drivers only age 25 and over  
5. Complete stop at an intersection  
6. Restricted use of Red Lights and Sirens  
7. Monitoring of emergency vehicle operations

EMS

## WEMSA – October 2007

1. Emergency Vehicle Operations Policy
2. Vehicle operations training and evaluation
3. A program of graduated driver responsibility
4. Drivers only age 25 and over
5. Complete stop at an intersection
6. Restricted use of Red Lights and Sirens
7. Monitoring of emergency vehicle operations

## WEMSA covered some key and important policies and procedures But....

- ▶ What about hours of service?
- ▶ What about visibility at the scene? For providers and the vehicles...?
- ▶ What about protective equipment?
- ▶ What about ambulance design safety?
- ▶ What about reporting of adverse events?

## Dynamic Safety Testing

- ▶ requires sophisticated, expensive equipment
- ▶ measurably demonstrates forces generated during collision
- ▶ accepted international standard for vehicle restraint systems

## The Crash Event - Crash Testing

- ▶ An introduction
- ▶ What one needs to know
- ▶ What do the tests really mean
- ▶ And, what tests are meaningful

## Intrusion vs Deceleration

- ▶ **Intrusion**  
= vehicle to vehicle or vehicle to fixed narrow object
- ▶ **Deceleration**  
= sudden stop – ie. sled test

### Intrusion



### Deceleration



### If we know this – and its published...



Levick NR, et al. Development and Application of a Dynamic Testing Procedure for Ambulance Pediatric Restraint Systems, SAE Australasia 1998:58:2-45-51

### Why do we do this?



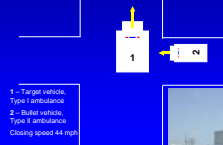
### Choose the Best Option

### Foldable



### Full Vehicle Crash Testing

#### Test 1 – Right side impact



And this all takes place in 60 milliseconds – the blink of an eye

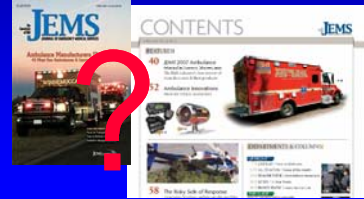


### NIOSH Ambulance Occupant Safety Crash Testing



Impact Direction  
25 MPH!

'Safety' approaches being driven by manufacturers claims and sales rather than by science and data



### USA Ambulances: FMVSS Exempt

DEPARTMENT OF TRANSPORTATION  
National Highway Traffic Safety Administration

49 CFR Parts 571, 572, and 589  
(Docket No. 02-26; Notice 7)  
[RIN No. 2127-AB85]

Federal Motor Vehicle Safety Standards:  
Occupant Protection

§ 571.571-1 Vehicles manufactured on or after September 1, 2000 and before September 1, 2002. Except as provided in § 571.571-1.1, for vehicles manufactured on or after September 1, 2000, ambulances, except those that are exempt from the requirements of this subpart, are required to be: (1) for 2000, 2001, and 2002, a motor vehicle equipped with a seat belt; and (2) for 2000, 2001, and 2002, a motor vehicle equipped with a seat belt and a seat belt pretensioner. The requirements of this subpart do not apply to any motor vehicle that is not subject to the provisions of § 571.571-1. The purpose of this exemption is to ensure that ambulances are not subject to the requirements of 49 CFR 571.571-1.

§ 571.572-1 Vehicles manufactured on or after September 1, 2002. Except as provided in § 571.572-1.1, vehicles manufactured on or after September 1, 2002, when the vehicle is used to transport patients, are required to be: (1) a motor vehicle equipped with a seat belt; and (2) a motor vehicle equipped with a seat belt pretensioner. The requirements of this subpart do not apply to any motor vehicle that is not subject to the provisions of § 571.572-1.1.

§ 589.589-1 Vehicles required to meet the requirements of §§ 571 through 587. For the purpose of this section, a vehicle is considered to be a motor vehicle if it is a motor vehicle as defined in 49 CFR 571.3-1. For the purpose of this section, a vehicle is considered to be a motor vehicle if it is a motor vehicle as defined in 49 CFR 571.3-1. For the purpose of this section, a vehicle is considered to be a motor vehicle if it is a motor vehicle as defined in 49 CFR 571.3-1.

### Propaganda that kills...

AMBULANCE MANUFACTURERS DIVISION  
The National Truck Equipment Association  
Page 1 of 5

#### AMD Position Statement on Ambulance Safety and Occupant Protection

The purpose of this paper is to establish the position of the members of the Ambulance Manufacturers Division (AMD) of the National Truck Equipment Association.

Ambulances must comply with some of the strictest safety and performance standards applicable to vehicles in the United States. All motor vehicles operated on public roads and highways must conform to Federal Motor Vehicle Safety Standards (FMVSS) contained in Title 49 of the Code of Federal Regulations Part 571. Ambulances are no exception. FMVSS are the most visible and vigorously enforced safety standards governing the design, engineering and production of such vehicles. Nearly all government purchased ambulances, and the overwhelming majority of those sold to the public, also must be certified to the safety requirements of the Federal Star of Life Specification for Ambulances, KKK-A-1822, promulgated by the federal government. These requirements are in addition to FMVSS.

Being a member of the first or one of the first manufacturers to develop and produce ambulances is an honor. AMD and its member manufacturers are proud of the safety and performance of their ambulances. AMD and its member manufacturers are committed to providing the highest quality ambulances to the public. AMD and its member manufacturers are committed to providing the highest quality ambulances to the public. AMD and its member manufacturers are committed to providing the highest quality ambulances to the public.

### Occupant protection.....??

July 2007

Medic Survivors

Medic Fatality

### USA ambulance purchase specifications

GSA:KKK-A-1822F, Aug 2007

- ▶ Static Pull test
- ▶ 2200 Lbs. (8G's) in Longitudinal and Lateral
- ▶ No dynamic test
- ▶ No definition to manikin mass
- ▶ No restraint for equipment
- ▶ Voluntary

### KKK/AMD – 'safety testing'

- ▶ Ignorant of automotive safety principles – and specifies that a 'successful test' is -
  - ♦ No structural damage to any load bearing or supporting members, i.e., torn or broken material, broken welds, popped or sheared body rivets, bolts, and/or fasteners, shall be evident during the application of the force and after the release of the force.

### Unacceptable, and ridiculous current 2007 USA ambulance 'safety testing' practices !??

AMBULANCE TEST RECORD BROKEN

36,000 lbs on ROOF

55,000 lbs on SIDE

55,000 lbs on SIDE

THAT WAS THEN

THIS IS NOW...

In 2000, shattered industry records by testing and certifying the modular body to more than double the 150% curb weight Federal Standard. In addition, they performed a body side test that had never been seen before. Now has broken that record with a 55,000 body test on the top and side of the modules. The ambulance body is now certified to a 500% curb weight level. **-MORE INFO**

INDUSTRY LEADING SAFETY INNOVATION

No 'a'... then NO 'F' !!!!

▶  $F = ma$

where F – force  
m – mass  
a – acceleration

Sir Isaac Newton (1642-1727), Philosophiæ Naturalis Principia Mathematica (Mathematical Principles of Natural Philosophy), published in 1687. <https://www.pearson.com/us/higher-education/author/sir-isaac-newton>

Its not magic... what is safe is known and understood



NOT new technical data...



Richardson S.A., et al. *Int. J. of Crash*, 4:3, 239 - 259, 1999  
Side facing 4-point harnesses demonstrated to be lethal, even at slow ground vehicle speeds

Being seated IN an automotive seat is what will protect you

- ▶ Anything that allows or encourages you to get up out of your seat will also encourage you to be injured or killed – it is potentially lethal to be out of your seat in any fashion
- ▶ 4 or 5 point harnesses for sidelifacing occupants are potentially lethal – and is in NO WAY SUPPORTED BY ANY DATA OR AUTOMOTIVE SAFETY EXPERTISE

Innovation

Safety concepts out there now

- ▶ Driver feedback technologies
- ▶ Tiered dispatch
- ▶ Enhanced ambulance vehicle design
- ▶ Intelligent Transport Technologies - ITS
- ▶ New Safety Standards

The EMS Safety Foundation  
Intro and Logistics Webinars from  
December 11th 2007 & Jan 8<sup>th</sup> 2008  
EMS Safety Foundation tab at  
[www.objectivesafety.net](http://www.objectivesafety.net)



National Academies Transportation Research Board's (TRB)  
And Your New EMS Transport Safety Subcommittee



TRB EMS Safety Update

- ▶ Brought together NHTSA, FHWA, TRB, National Academies, DOT, CAMTS & EMS
- ▶ 3 presentations
  - TRB and EMS
  - Safety air/ground
  - Ground Ambulance Safety Issues and Directions
- ▶ Recorded presentations and handouts available at [www.objectivesafety.net](http://www.objectivesafety.net)
- ▶ Potential for EMS safety research funding
- ▶ Next TRB meeting January 11-15, 2009 – all are welcome

**Ambulance Transportation Safety Task Force  
January 25<sup>th</sup> 2008**

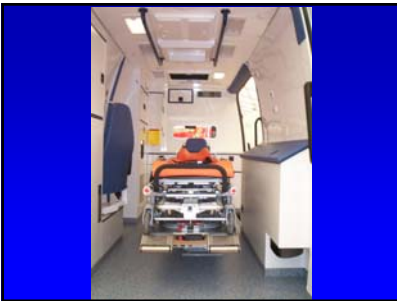
TRB  
Jan.  
16<sup>th</sup>  
2008



**International approaches**

- ▶ The state of the art non-USA vehicles have NO squad bench nor the after market structural vehicle modifications that can potentially decrease crashworthiness integrity that were seen in study vehicles.

**RETTmobil – ‘Mobile Rescue’  
Major event for EMS innovation  
Fulda, Germany  
<http://www.rettmobil.com/>**



**Vehicle Occupant Safety design**

2007 European design  
Safety technology is a  
key focus



**Australia, Melbourne**



**NSW Australian vehicles**



**Flexibility to manage two patients**



**High speed crash, rolled and the occupants (patient and medics) had only minor scratches**



**Norway initiatives**



**Sweden initiatives**



**Other successful models**



**Ergonomic layout and equipment**



**Securing equipment**



**Safety concepts out there now**

- ▶ Fleet Safety Management
  - Z-15
  - Driver monitoring and feedback
- ▶ Enhanced ambulance vehicle design
- ▶ Intelligent Transport Technologies - ITS
- ▶ Visibility and Conspicuity
- ▶ New Safety Standards
- ▶ Life Safety Initiatives
- ▶ Resources and information

## American National Standard ANSI/ASSE Z15.1-2006 Safe Practices for Fleet Motor Vehicle Operations

The image shows the front cover of the ANSI/ASSE Z15.1-2006 standard. The cover is white with a blue border and features the ANSI logo at the top. The title 'American National Standard' is prominently displayed in the center, with 'ANSI/ASSE Z15.1-2006' and 'Safe Practices for Fleet Motor Vehicle Operations' below it. The document is published by the American National Standards Institute.

- ### What Z15 encompasses
- ▶ Safety Program
  - ▶ Safety Policy
  - ▶ Responsibilities and Accountabilities
  - ▶ Driver Recruitment, Selection and Assessment
  - ▶ Organizational Safety Rules
  - ▶ Orientation and Training
  - ▶ Reporting Rates and Major Incidents to Executives
  - ▶ Oversight



## NAEMT July 2006 Position statement

The image shows the NAEMT logo at the top left, which includes a star and the acronym 'NAEMT'. To the right of the logo is a photograph of several people in emergency medical services uniforms. Below the logo and photo is the title 'National Association of Emergency Medical Technicians Statement on Safety Restraint Use in Emergency Medical Services'. The document contains several sections, including 'Background', which discusses the importance of seat belt use for EMTs and the need for proper training and equipment.

## News we don't want to see

### Caught On Video: EMT Struck By Car

Jan 22, 2007 6:39 am UT/Eastern

**By Ian Young**  
Reporting

(CBS) BROOKLYN The car hit 46-year-old Capt. Steven Quindongo so violently it smashed the vehicle's windshield and sent him flying through the air.

Quindongo, a 19-year veteran of the city's emergency medical services, was on the scene of a fire on Riverside Avenue in the Bronx Sunday afternoon when a civilian car moved past police barricades and caught him from behind. Chief Wayne Stufeland was on the scene as the damaged health food store where his men had successfully put out the flames.

"We had two firefighter minor injuries," he told us, "and they were taking care of our man and when he (Quindongo) was walking back to the ambulance he was struck by the civilian vehicle."

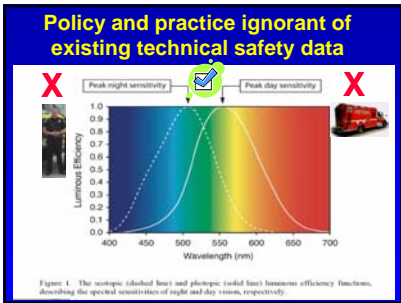
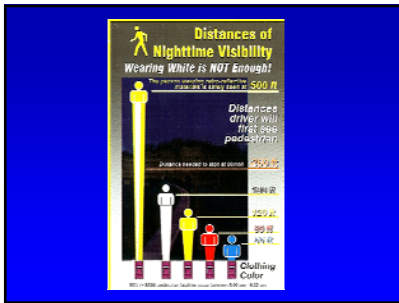
## Worker visibility Act: Help is on the way !! November 24<sup>th</sup> 2008

The image is a screenshot of a document titled 'PART 63—WORKER VISIBILITY'. It contains several sections, including '6301.1 Scope', '6301.2 Definitions', '6301.3 Date', and '6301.4 Certificate Area'. The text discusses the requirements for high-visibility safety apparel for workers on roadways. A key section states: 'All workers who are the right-of-way of a Federal-aid highway to be engaged in or to be engaged in the course of their employment shall wear high-visibility safety apparel.' The document also mentions that workers must place their high-visibility safety apparel on their bodies when they are in the right-of-way of a Federal-aid highway, such as highway construction and maintenance, snow, survey, utility, crane, or other work.

## There are grants to assist you..

### Federally-Mandated Worker Visibility Regulation Summary

The image shows a document titled 'Federally-Mandated Worker Visibility Regulation Summary'. It includes a photograph of a high-visibility safety vest. The text explains that the regulation requires workers on roadways to wear high-visibility safety apparel. It also mentions that the regulation applies to workers on roadways, including those in the course of their employment. The document provides a summary of the key requirements and deadlines for compliance.





### Under Way... Emergency Vehicle Visibility and Conspicuity Study

- ▶ Funded by the USFA conducted by IFSTA
- ▶ Looking at the effectiveness of reflective markings used on emergency vehicles
- ▶ Doing best practice research and working with manufacturers



▶ Operating in an environment where many aspects of safety are still devoid of safety standards – requires technical knowledge and understanding



But whatever color .... If you run a red light some will be killed



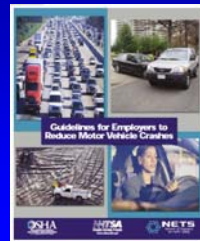
### R & D "Ripoff and Duplicate"

- ▶ Avoid reinventing the wheel at all costs
- ▶ Where are the best practices that we need to transfer knowledge from

Air EMS is a role model for safety initiatives and focus



No need to reinvent the wheel...



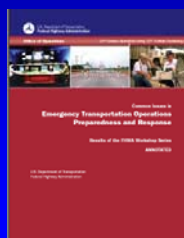
UPS: The 'Big Brown'

- ▶ No left turns – instead make three rights
- ▶ Don't back up
- ▶ Don't employ any drivers under 25 years of age
- ▶ Don't employ anyone with a history of driving convictions

Make three rights



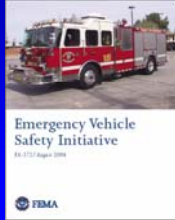
March 2007 - FHWA



Tips for Emergency Vehicle Operations



## USFA Emergency Vehicle Safety Initiative



## July 2007



## Traffic Incident Management Systems (TIMS)

- ▶ Just released April 2008
- ▶ FEMA, USFA, IFSTA
- ▶ Covers setting up safe roadway incident work areas and using unified command at these incidents



### What do we know now??

- ▶ Intersection crashes are the most lethal
- ▶ There are documented hazards, some which can be avoided
- ▶ Occupant and equipment restraint with standard belts is effective. (Over the shoulder harnesses for patients should be used, with the gurney in the upright position where medically feasible)
- ▶ Some vehicle design features are beneficial - automotive grade padding in head strike areas, seats that can slide toward the patient
- ▶ Electronic Driver monitoring/feedback systems appear to be highly effective
- ▶ Head protection??

### Safety Management

- ▶ A Safety Culture
- ▶ Protective Policies
- ▶ Protective Devices
  - To prevent a crash
  - In the event of a crash
- ▶ Continuous Education and Evaluation

### So....

- ▶ Which vehicle do you want to be in ?
- ▶ Which vehicle is the best for efficient, and effective patient care?
- ▶ Which vehicle provides optimal risk management ?
- ▶ What is the optimal fleet mix?

### Risk/Hazards

- ▶ Predictable risks
- ▶ Predictable fatal injuries
- ▶ Serious occupational hazard
- ▶ Public safety hazards

### Creating a Safety Culture

within a company must start with upper management's commitment to safety

- ▶ Awareness
- ▶ Training
- ▶ Incentive

### Some simple and available solutions out there now

- ▶ Intersection Policy
- ▶ PPE
- ▶ 'Feedback' boxes

### What do we know works...

- ▶ Vehicle Operations Safety Policies
- ▶ Squad bench lap seat belts
- ▶ Patient over the shoulder harnesses
- ▶ Securing equipment
- ▶ Forward and rear facing seating
- ▶ Some electronic technical devices
- ▶ Safety awareness
- ▶ Cultural change

### What you can do now

- ▶ Have a written and implemented 'safety program'
- ▶ Secure all equipment
- ▶ Secure occupants with standard belts
- ▶ Don't drive through red lights/stop signs
- ▶ Use properly implemented "Feedback Boxes"
- ▶ Monitor crash events with common denominators (ie. per 100,000 miles and per trip)

### Important Principles !

1. A culture of safety
  2. Drive cautiously
  3. Wear your belts & restrain all occupants
  4. Secure all equipment
  5. Integrate scientific data into your policies and procedures
- Unrestrained occupants and equipment are a potential injury risk to all occupants

### Very Important Principle

Ambulance transport safety is part of a **SYSTEM**, the overall balance of risk involves the safety of all occupants and the public

### small changes can make a BIG DIFFERENCE

- ▶ **PREPARE – TEACH – REACH – RESPOND**
  - ♦ Look at your own safety record
  - ♦ Teach safety and hazard awareness
  - ♦ Reach out with safety information to all your EMS providers
  - ♦ Respond with the best safety practices

**PREDICTABLE  
PREVENTABLE  
and  
NO ACCIDENT**

### Conclusion

- ▶ EMS transport has serious hazards and safety issues
- ▶ Major advances in EMS safety research, infrastructure and practice over the past 5 years
- ▶ New technologies for vehicle design, occupant PPE and equipment restraint and driver performance are now available
- ▶ Development of substantive EMS safety standards is a necessity and a reality
- ▶ Failure to transfer knowledge from transportation and automotive safety is unacceptable and dangerous
- ▶ EMS is still way behind the state of the art in vehicle safety and occupant protection

### And....

- ▶ It is no longer acceptable for EMS to be functioning outside of automotive safety and PPE safety standards for prevention of and protection of EMS providers and the public from injury and death

Thank you!

Any Questions??

Electronic handout available online  
<http://www.objectivesafety.net>

